

What is claimed is:

1. A method of forming a tactile walking surface structure in place having underfoot detectability, comprising:

providing a plurality pins, the pins each having an upper end head portion and a shank portion; the shank portion of each of the pins having a length;

forming a plurality of holes in an upper surface of a concrete slab of a walkway that each have a diameter sized to receive the shank portion of one of the pins; the holes being located within a defined area of the upper surface of the concrete slab that is at least one foot in width by at least two feet in length; the holes being spaced from each other in a predetermined pattern so that, when the shank portions of the pins are inserted into the holes and bonded to the concrete slab with the upper end head portions of the pins projecting upward beyond the upper surface of the concrete slab at least a minimum distance, the upper end head portions of the pins in the defined area of the upper surface of the concrete slab form a walking surface having underfoot detectability;

inserting the shank portions of the pins into the holes with the upper end head portions of the pins projecting upward beyond the upper surface of the concrete slab at least the minimum distance; and

bonding the inserted pins to the concrete slab to form a walking surface having underfoot detectability.

2. The method of forming a tactile walking surface structure in place having underfoot detectability according to claim 1, wherein:

the area is at least two feet in width by at least three feet in length.

3. The method of forming a tactile walking surface structure in place having underfoot detectability according to claim 2, including:

forming the holes in a repetitive square pattern of rows and columns with a center-to-center spacing between adjacent holes in each row and each column of the pattern being about 2.35 inches and a diagonal center-to-center spacing between the holes forming each square of the pattern being about 3.32 inches; and

having the upper end head portions of the pins projecting upward beyond the upper surface of the concrete slab at least the minimum distance of 0.20 inches.

4. The method of forming a tactile walking surface structure in place having underfoot detectability according to claim 3, wherein:

the upper end head portion of each of the pins is truncated dome.

5. The method of forming a tactile walking surface structure in place having underfoot detectability according to claim 4, wherein:

the concrete slab has a compressive strength; each of the pins has a compressive strength substantially equal to or greater than the compressive strength of the concrete slab; each of the pins is made of a cementitious material, and each of the pins has substantially the same coefficient of thermal expansion as the concrete slab.

6. The method of forming a tactile walking surface structure in place having underfoot detectability according to claim 5, including:

bonding each of the pins to the hole within which the shank portion of the pin is inserted with a thermoplastic or thermosetting polymeric adhesive.

7. The method of forming a tactile walking surface structure in place having underfoot detectability according to claim 4, wherein:

the concrete slab has a compressive strength; each of the pins has a compressive strength substantially equal to or greater than the compressive strength of the concrete slab; and each of the pins is made of a corrosion resistant metal.

8. The method of forming a tactile walking surface structure in place having underfoot detectability according to claim 7, including:

bonding each of the pins to the hole within which the shank portion of the pin is inserted with a thermoplastic or thermosetting polymeric adhesive.

9. The method of forming a tactile walking surface structure in place having underfoot detectability according to claim 8, including:

creating a reservoir between each hole formed in the concrete slab and the pin inserted into the hole for accommodating adhesive flow caused by relative expansion and contraction between the hole in the concrete slab and the pin.

10. The method of forming a tactile walking surface structure in place having underfoot detectability according to claim 3, wherein:

the upper end head portion of each of the pins is larger in diameter than the diameter of the shank portion of each of the pins and the diameter of each of the holes.

11. The method of forming a tactile walking surface structure in place having underfoot detectability according to claim 10, wherein:

the upper end head portions of the pins are truncated domes.

12. The method of forming a tactile walking surface structure in place having underfoot detectability according to claim 11, wherein:

the concrete slab has a compressive strength; each of the pins has a compressive strength substantially equal to or greater than the compressive strength of the concrete slab; each of the pins is made of cementitious material; and each of the pins has substantially the same coefficient of thermal expansion as the concrete slab.

13. The method of forming a tactile walking surface structure in place having underfoot detectability according to claim 12, including:

bonding each of the pins to the hole within which the shank of the pin is inserted with a thermoplastic or thermosetting polymeric adhesive.

14. The method of forming a tactile walking surface structure in place having underfoot detectability according to claim 11, wherein:

the concrete slab has a compressive strength; each of the pins has a compressive strength substantially equal to or greater than the compressive strength of the concrete slab; and each of the pins is made of a corrosion resistant metal.

15. The method of forming a tactile walking surface structure in place having underfoot detectability according to claim 14, including:

bonding each of the pins to the hole within which the shank of the pin is inserted with a thermoplastic or thermosetting polymeric adhesive.

16. The method of forming a tactile walking surface structure in place having underfoot detectability according to claim 15, including:

creating a reservoir between each hole formed in the concrete slab and the pin inserted into the hole for accommodating adhesive flow caused by relative expansion and contraction between the hole in the concrete slab and the pin.

17. The method of forming a tactile walking surface structure in place having underfoot detectability according to claim 10, including:

forming each of the holes in the area of the concrete slab to a greater depth than the length of the shank portion of each of the pins so that the height of the upper end head portion of each of the pins above the upper surface of the concrete slab is a preselected distance that is at least the minimum distance when the upper end head portion of the pin is resting on the upper surface of the concrete slab.

18. The method of forming a tactile walking surface structure in place having underfoot detectability according to claim 1, including:

forming the holes in the upper surface of the concrete slab by drilling.

19. The method of forming a tactile walking surface structure in place having underfoot detectability according to claim 18, including:

using a template with a selected hole pattern to establish the locations for drilling the holes in the upper surface of the concrete slab.

20. The method of forming a tactile walking surface structure in place having underfoot detectability according to claim 18, including:

using an indexing drilling assembly to establish the locations for drilling the holes in the upper surface of the concrete slab and drilling the holes with the drilling assembly.

21. A made in place tactile walking surface structure having underfoot detectability, comprising:

a concrete slab of a walkway having a plurality of holes in an upper surface of the concrete slab; the holes being located within a defined area of the upper surface of the concrete slab that is at least one foot in width by at least two feet in length;

a plurality of pins that each have an upper end head portion and a shank portion; the shank portion of each of the pins having a length; the shank portion of each of the pins being inserted into and bonded to one of the holes with the upper end head portion of each of the pins projecting upward beyond the upper surface of the concrete slab at least a minimum distance so that the upper end head portions of the pins in the defined area of the upper surface of the concrete slab form a walking surface having underfoot detectability.

22. The made in place tactile walking surface structure having underfoot detectability according to claim 21, wherein:

the area is at least two feet in width by at least three feet in length.

23. The made in place tactile walking surface structure having underfoot detectability according to claim 22, wherein:

the holes are located in a repetitive square pattern of rows and columns with a center-to-center spacing of adjacent holes in each row and each column of the pattern being about 2.35 inches and a diagonal distance between the holes forming each square of the pattern being about 3.32 inches; and

the upper end head portions of the pins project upward beyond the upper surface of the concrete slab at least the minimum distance of 0.20 inches.

24. The made in place tactile walking surface structure having underfoot detectability according to claim 23, wherein:

the upper end head portion of each of the pins is a truncated dome.

25. The made in place tactile walking surface structure having underfoot detectability according to claim 24, wherein:

the concrete slab has a compressive strength; each of the pins has a compressive strength substantially equal to or greater than the compressive strength of the concrete slab; each of the pins is made of cementitious material; and each of the pins has substantially the same coefficient of thermal expansion as the concrete slab.

26. The made in place tactile walking surface structure having underfoot detectability according to claim 25, wherein:

each of the pins is bonded to the hole within which the shank portion of the pin is inserted with a thermoplastic or thermosetting polymeric adhesive.

27. The made in place tactile walking surface structure having underfoot detectability according to claim 24, wherein:

the concrete slab has a compressive strength; each of the pins has a compressive strength substantially equal to or greater than the compressive strength of the concrete slab; and each of the pins is made of a corrosion resistant metal.

28. The made in place tactile walking surface structure having underfoot detectability according to claim 27, including:

each of the pins is bonded to the hole within which the shank of the pin is inserted with a thermoplastic or thermosetting polymeric adhesive.

29. The made in place tactile walking surface structure having underfoot detectability according to claim 23, wherein:

the upper end head portion of each of the pins is larger in diameter than the diameter of the shank portion of each of the pins and the diameter of a shank receiving portion of each of the holes.

31. The made in place tactile walking surface structure having underfoot detectability according to claim 29, wherein:

the upper end head portion of each of the pins is a truncated dome.

32. The made in place tactile walking surface structure having underfoot detectability according to claim 31, wherein:

the concrete slab has a compressive strength; each of the pins has a compressive strength substantially equal to or greater than the compressive strength of the concrete slab; each of the pins is made of cementitious material; and each of the pins has substantially the same coefficient of thermal expansion as the concrete slab.

33. The made in place tactile walking surface structure having underfoot detectability according to claim 32, wherein:

each of the pins is bonded to the hole within which the shank portion of the pin is inserted with a thermoplastic or thermosetting polymeric adhesive.

34. The made in place tactile walking surface structure having underfoot detectability according to claim 31, wherein:

the concrete slab has a compressive strength; each of the pins has a compressive strength substantially equal to or greater than the compressive strength of the concrete slab; and each of the pins is made of a corrosion resistant metal.

35. The made in place tactile walking surface structure having underfoot detectability according to claim 34, wherein:

each of the pins is bonded to the hole within which the shank portion of the pin is inserted with a thermoplastic or thermosetting polymeric adhesive.

36. The made in place tactile walking surface structure having underfoot detectability according to claim 35, including:

a reservoir between each hole and the pin inserted into the hole for accommodating adhesive flow caused by relative expansion and contraction between the hole in the concrete slab and the pin.

37. The made in place tactile walking surface structure having underfoot detectability according to claim 29, wherein:

each of the holes in the area of the concrete slab to a greater depth than the length of the shank portion of each of the pins so that the height of the upper end head portion of each of the pins above the upper surface of the concrete slab is a preselected distance that is at least the minimum distance when the head portion of each of the pins is resting on the upper surface of the concrete slab.